

Notice of Allowability

Application No.

10/645,819

Examiner

Jason M. Repko

Applicant(s)

GREEN ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment dated 4 December 2006.
2. ☒ The allowed claim(s) is/are 1-5,23,24,26,27,33-35,39,40,42 and 44-46.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

To correct a typographical error in line 11 of claim 23, replace "presnetation" with "presentation."

In paragraph [0001.] on page 1 of the descriptive portion of the specification in section "CROSS REFERENCE TO RELATED APPLICATION," replace the underscore and attorney docket number with the U.S. patent application serial number,

This application is related to U.S. patent application Ser. No. 10/645,694 _____ (~~Attorney Docket No. SONYPO25/SCEA02020US00~~), filed on the same day as the instant application and entitled "METHOD AND APPARATUS FOR SELF SHADOWING AND SELF INTERREFLECTION LIGHT CAPTURE," which is incorporated herein by reference for all purposes.

2. The following is an examiner's statement of reasons for allowance: In the Office Action dated 6 September 2006, claims 12-22 and 33-28 were rejected under 35 U.S.C. 101 as nonstatutory natural phenomena. This rejection is withdrawn in view of Applicant's remarks dated 4 December 2006:

However, what is claimed is "computer readable media," and not the carrier wave, which is another embodiment that can later be introduced by the Applicant in a continuation, if so desired.

3. Independent claims 1, 23, 33 and 39, contain features not found in the prior art.
4. With regard to claim 1, Peter-Pike Sloan, Jan Kautz, John Snyder, "Precomputed Radiance Transfer for Real-Time Rendering in Dynamic, Low-Frequency Lighting Environments," July 2002, ACM Transactions on Graphics, Vol. 21 No. 3, p. 527-536 (Sloan et al) teaches "a method for presenting lighting characteristics associated with a display object in real-time, comprising: executing a ray tracing algorithm that includes generating a ray associated with a point on the display object" (5th paragraph of section 5). Sloan et al teaches "determining an approximation of a transfer function component using at least one basis function" in the equations given in the 6th and 7th paragraphs of section 5. Sloan et al does not teach ray tracing on stream processor. Timothy J. Purcell, Ian Buck, William R. Mark, Pat Hanrahan, "Ray Tracing on Programmable Graphics Hardware," July 2002, ACM Transactions on Graphics, Vol. 21, No. 3, p. 703-712 (Purcell et al) teaches "executing a ray tracing algorithm through a stream processor" (Figure 2, page 705). However, neither Purcell et al nor Sloan et al disclose step (b) in combination with the aforementioned limitations.
5. With regard to claims 23 and 33, Sloan et al teaches "a method for calculating an approximation to a transfer function defined by at least one basis function for rendering shading characteristics of an object in real time, comprising: identifying a point on the object; calculating a lighting function for the point" (1st paragraph of section 5). Sloan et al teaches "determining a direct illumination transfer function for the point" by means of a ray tracer (1st paragraph of

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section 5; 3rd paragraph of section 5). Sloan et al teaches applying a ray tracing algorithm without accessing pre-calculated geometry associated with the object (*4th paragraph of section 4; 1st paragraph of section 6.2*). Sloan et al does not teach ray tracing on a stream processor in real-time. Purcell et al teaches "applying a ray tracing algorithm through a stream processor" (*Figure 2, page 705*). Purcell et al teaches "determining a secondary lighting contribution in real time through a series of multiply and add operations applied to data resulting from the ray tracing algorithm" (*4th paragraph of section 3*). With regard to the multiply and add operations for secondary lighting for secondary illumination, the triangle intersection stage (as shown in Figure 2 on page 705 of Purcell et al) occurs after the traversal stage. Figure 5 (Code for ray-triangle intersection) shows the dot product operation for two vectors on lines 12, 14, and 15. Sloan does not disclose determining secondary lighting contribution in real time during the video presentation. Neither Purcell et al nor Sloan et al alone or in combination disclose steps (iii) and (iv) recited in claims 23 in combination with the aforementioned limitations, or program instructions for determining secondary lighting contributions and program instruction for combining coefficients as recited in claim 33 in combination with the aforementioned limitations.

6. With regard to **claim 39**, Jan Kautz, Peter-Pike Sloan and John Snyder, "Fast, Arbitrary BRDF Shading for Low-Frequency Lighting Using Spherical Harmonics," June 26, 2002, Proceedings of the 13th Eurographics Workshop on Rendering, p. 291-296, 335(Kautz et al) discloses "a computing device, comprising: a graphics processing unit (GPU) capable of determining lighting characteristics for an object in real time (*3rd paragraph of section 4; steps 2-4 in the 1st paragraph of section 4, p. 293; section 6*), the lighting characteristics defined through

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a basis function (*2nd paragraph of section 3*), the GPU including a stream processor configured to split a stream of data associated with the lighting characteristics into multiple simultaneous operations (*3rd paragraph of section 4*), the lighting characteristics further determined without preprocessing data to determine a fixed transfer function" (*9th paragraph of section 2*). Kautz et al does not disclose steps (i) through (iv) in combination with the aforementioned limitations recited in claim 39. John D. Owens, William J. Dally, Ujval J. Kapasi, Scott Rixner, Peter Mattson, Ben Mowery, "Polygon Rendering on a Stream Architecture," August 2000, Proceedings of the ACM SIGGRAPH/EUROGRAPHICS Workshop on Graphics Hardware, p.23-32 (Owens et al) discloses a stream processor but does not disclose a stream processor in combination with the limitations recited in claim 39.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Repko whose telephone number is 571-272-8624. The examiner can normally be reached on Monday through Friday 8:30 am -5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMR


ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER